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NEW FROGS FROM CUBA.¹

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I WAS so fortunate last year as to be able to spend nearly two months at the Harvard Biological Station on the Atkins estate at Soledad, near Cienfuegos, on the southern coast of Cuba. There and in the nearby Trinidad Mountains I observed the habits and calls of several species of *Eleutherodactylus*, and collected a number of specimens. The present descriptions are to be considered as preliminary accounts of the more striking novelties. When the status of *E. varians* shall have been settled it will be possible to decide the status of several more problematical forms that were taken.

I am indebted to Dr. Thomas Barbour for the opportunity of making the trip and to the officials of the Central and of the various Colonias for much hospitality and assistance.

At Soledad itself, *Eleutherodactylus ricordii* and *E. cuneatus* were common species. In the mountains *E. dimidiatus*, famous throughout that region as the "kolín", was the prevalent form. Three other forms were taken in or near Soledad itself which appear to be undescribed. The first of these is a tiny grass-haunting species which seems to be widespread and common in Cuba, as I have seen specimens in collections from Santiago, Matanzas, La Modesta, and Havana. I take pleasure in naming it after a hospitable friend, Mr. James B. Varley of Guabairo, who helped me collect the first I saw.

Eleutherodactylus varleyi, sp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, No. 10601, from Soledad, Cuba. Collected by E. R. Dunn. August, 1924.

Range.—Known from several localities in eastern and central Cuba.

Diagnosis.—Allied to *E. minutus* and *E. abbotti* of Santo Domingo. Toes free; disks very small; belly granular; back with scattered warts, and a dorso-lateral line of warts; throat and chest inflatable; a white mark below eye.

Description (Mus. Comp. Zoöl., No. 10561, adult male).—Head slightly longer than broad, narrower than body; distance between anterior corner of eye and nostril greater than the diameter of the eye, equal to interorbital

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width; upper eyelid much narrower than interorbital width; distance between nostril and snout contained two and one-half times in distance from nostril to eye; *canthus rostralis* rounded; loreal region slightly convex; tympanum distinct, two-thirds the diameter of the eye, separated from the eye by less than one-half its own diameter; heels touch when legs are at right angles to the body; digits scarcely dilated; no webs; second finger longer than first; no tarsal fold; metatarsal tubercles poorly developed; a series of elongate glandular elevations forms a dorso-lateral fold from tympanum to groin; sides below this with lines of glands; a few smaller glands on back, especially two such on the scapular region; center of belly smooth, sides coarsely granular; throat and chest developed into vocal sac; a discoidal ventral fold; under sides of thighs heavily granular; vomerine teeth from outer edge of choanae curving inward, inner end at level of outer, separated from fellow by two-thirds length of series, and from choanae by one-third length of series. Color, light brown; band between eyes, warts on shoulders and band in front of sacrum, dark; two bars on tibia; a white line under eye; a white spot at hinder, lower corner of tympanum; sides pale; below white. Length 14 mm.; head 5; tibia 7; leg 19; arm 7.5.

Variation.—Several specimens have an inverted V on shoulders; vomerine teeth may begin below middle of choanae, and be separated from those of opposite side by one-half length of series and from choanae by same distance.

Paratypes: Mus. Comp. Zool. Nos. 10599–600, 105602, from Soledad; 10603–4 from Guabairo.

The species around Soledad which is arboreal and whose call can be heard in loud choruses for some distance, is clearly related to *E. auriculatus* from eastern Cuba, but is as clearly different. The diagnostic characters must be understood as applying to specimens from Oriente and from Soledad, and not necessarily applying to the Santo Domingan or Porto Rican forms.

Eleutherodactylus sonans, sp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, No. 10609, from Soledad, Cuba. Collected by E. R. Dunn. July–August, 1924.

Diagnosis.—Closely related to *E. auriculatus*, but differing in its smaller size; smaller tympanum (one-third rather than one-half the diameter of the eye); disks of fingers and toes not all same size, largest equal the tympanum in diameter rather than one-third its diameter; heel not to middle of eye; heels barely touching when appressed; tip of toe V not reaching penultimate tubercle of toe IV, instead of beyond it; tip of toe I not reaching disk of toe II; vomerine series shorter.

Description (Mus. Comp. Zool., No. 10609, adult male).—Head as long as broad, broader than body; distance from eye to nostril shorter than diameter of eye and equal to interorbital space; equal to twice the distance from snout to nostril; *canthus rostralis* sharp; lores flat, sloping; tympanum one-third the diameter of eye, separated from eye by its own diameter; heels touching when appressed; heel reaching to eye; disks of fingers III and IV, and of toe IV as large as tympanum, twice as large as disks of fingers I and II and toes I, II, III, and V; tip of toe V not reaching penultimate tubercle of toe IV; tip of toe I reaching disk of toe II; finely rugose above; two scapular warts; a supra-tympanic fold; a short fold obliquely upward from tympanum to middle of side followed by warts forming a curved dorso-lateral fold convex upward; belly granular; a fold across chest; a subgular vocal sac; vomerine teeth beginning in from inner edge of choanae; separated from fellow by one and one-half times length of series and from nares by same distance. Color, dark brown; a

light canthal line; lores dark; a black supra-tympanic mark; a dark interorbital bar; gular pouch with black dots; sides darker than back; belly light. Total length 19 mm.; head 6.

Variation.—Another specimen has a light dorsal line, forking on to thighs; indistinct light bars on legs. Still another animal is light gray instead of dark brown. In all these the dark markings are the same.

Paratypes: Mus. Comp. Zoöl., Nos. 10605-8, 10610-3.

At Guabairo, one of the Colonias appertaining to the Central Soledad, in dry hill-forest, a large and beautiful frog with brilliant markings of scarlet and black was found. It is related to *E. ricordii* and to *E. cuneatus* and there has been considerable confusion in the past in regard to the three. *E. ricordii* is a small form in which there is no web, the heels do not overlap, there is no red in the coloration, no dorso-lateral fold, no W-shaped scapular fold, and in which fingers III and IV have perceptibly larger disks. *E. cuneatus* is a larger form with toes webbed at the base, heels not overlapping, no red, a dorso-lateral fold, a W-shaped scapular fold, fingers III and IV with slightly larger disks. The third is large, has no webs, the heels do not overlap, the thighs are red, there is a dorso-lateral fold, no W-shaped scapular fold, fingers III and IV are without larger disks. The habits, habitats and calls of the three are markedly different. *E. cuneatus* has a tendency to be aquatic. All three occur throughout Cuba, although *E. ricordii* seems to keep to lower altitudes. The type of *E. cuneatus* (U. S. Nat. Mus., No. 5702) has been examined. Stejneger (Proc. U. S. Nat. Mus., vol. 53, p. 262, fig. 8-12, 1917) employs the name *cuneatus* correctly, while Barbour (Mem. Mus. Comp. Zoöl., vol. 44, p. 244, 1914, and vol. 47, p. 105, pl. 13, fig. 9-11, 1919) and Schmidt (Proc. Linn. Soc. New York, vol. 33, p. 5, 1920) use *cuneatus* for the red-legged form and have considered true *cuneatus* specimens as large *ricordii*, to which, indeed, they bear much resemblance, and with which they are ordinarily found associating.

The brilliantly colored form therefore lacks a name and it seems appropriate to christen it in honor of Mr. Edwin F. Atkins, who, by the establishment of the Harvard Biological Station, has given a great impetus to the study of Cuban, and of tropical, biology.

Eleutherodactylus atkinsi, sp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, No. 10587, from Colonia Guabairo, near Cienfuegos, Cuba. Collected by E. R. Dunn. August 18, 1924.

Range.—Throughout the island.

Diagnosis.—Allied to *E. ricordii* and to *E. cuneatus*, but heels overlapping when appressed; concealed surfaces of thighs red; no webs between toes; none of the fingers with perceptible disks.

Description (Mus. Comp. Zoöl., No. 10587, adult male).—Head as long as broad, narrower than body; distance from eye to nostril greater than diameter of eye, greater than interorbital width, three times distance from nostril to snout; *canthus rostralis* blunt; lores flat, sloping; tympanum three-fourths diameter of eye; eye to tympanum equals one-third diameter of tympanum; heels overlap slightly when appressed; heel reaches eye; disks scarcely enlarged; toes free; no tarsal fold; skin granular above; a supra-tympanic fold; an oblique fold from tympanum downward to middle of side; a discoidal ventral fold; throat, chest and belly smooth; thighs granular below; vomerine teeth in long series beginning beyond outer edge of choanae, curving in and back, separated by width of choanae, and closer to choanae than to each other. Color, reddish brown above; lores, supra-tympanic mark, interorbital bar, supra-scapular bar and supra-sacral bar black; tibia with lighter bars; a black spot on groin and another on base of thigh; concealed surfaces of thighs red. Length 31 mm.; head 10.

Variation.—A female is 39 mm. long, and has the tympanum two-thirds the diameter of the eye. There may be a dorso-lateral light line, and a dorso-lateral row of warts; the general color may be pale gray instead of reddish brown. Specimens from Oriente seem to have the black spot on the thigh poorly or not at all developed. Specimens from Pinar del Rio have no black on thigh or on groin. These may represent races but it would be premature to distinguish them at present.

Paratypes: Mus. Comp. Zoöl., Nos. 10536, 10588-98.